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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/780,989	02/09/2001	Timothy G. Adams	50376	5885

21874 7590 03/18/2003

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EXAMINER

THORNTON, YVETTE C

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 03/18/2003

1/

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/780,989

Applicant(s)

ADAMS ET AL.

Examiner

Yvette C. Thornton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/25/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This is written in reference to application number 09/780989 filed on February 9, 2001 and published as US 2002/0012869 A1 on January 31, 2002.

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.
2. Claims 31 and 44 have been cancelled. Claims 26-30, 32-43 and 45-48 are currently pending.
3. The amendment filed on February 25, 2003 was sufficient to overcome the rejection of the claims under 35 USC 112, 1st and 2nd paragraphs.

Claim Interpretations

4. Upon further consideration of the pending claims, the examiner realized that she had misinterpreted the claimed invention. The examiner has interpreted the present claims to pertain to a photoresist composition comprising a photoactive component and a polymer that is substantially free of aromatic groups and comprises (1) units previously crosslinked to other polymer units by a separate crosslinker component and (2) photoacid labile groups.
5. The examiner notes that applicant has defined the term "crosslinking" and similar terms to refer to any covalent linkage between polymer chains or sites (see spec. pg. 3, l. 21-22). The following rejections are made in light of the said definition.
6. The specification defines the term "substantially free" to be less than about 5 mol percent aromatic groups, based on the total polymer (spec. pg. 3, l. 15-19).

7. The examiner further notes that claims 26-30, 31-34 and 47 contain the limitation that the polymer units are "crosslinked by a separate crosslinker component". This is a process limitation on a product claim. More specifically, the claim recites method limitations that do not further define the material. Therefore, any method may be used to make the material. Consequently, the burden shifts to Applicant to provide evidence of an unobvious difference between the claimed product and the prior art. Furthermore, "The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 180 USPQ 324,326 (CCPA 1974), see MPEP 2113.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

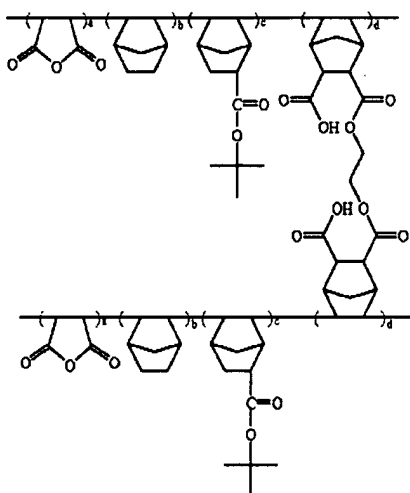
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 26-30, 32, 35-43 and 45 rejected under 35 U.S.C. 102(e) as being clearly anticipated by Lee et al. (US 6,200,731 B1). Lee teaches a photoresist copolymer comprising (i) an alicyclic compound having an acid labile group as the first comonomer, (ii) a crosslinking monomer as the second comonomer and (iii) maleic anhydride and/or a compound of formula 16 as the third comonomer (c. 3, l. 61-c. 4, l. 10). The said crosslinking monomer is represented by formula 1 (c. 1, l. 65-c.2, l. 30). Lee exemplifies the

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synthesis of ethylene glycol di(5-norbornene-2-carboxylic acid-3-carboxylate) as the said crosslinking monomer (see ex. 1, c. 5, l. 55-c. 6, l. 25). The said compound is made by reaction of ethylene glycol and 5-norbornene-2-carboxylic acid-3-carboxylate. The said compound was polymerized with maleic anhydride, norbornene and t-butyl-5-norbornene-2-carboxylate to obtain a polymer having the following structure:

<Chemical Formula 18>



(ex. 15, c. 12, l. 57-c, 13, l. 25). The polymer obtained in

example 15 was then admixed with triphenylsulfonium triflate as a photoacid generator and ethyl 3-ethoxypropionate solvent to obtain a photoresist composition. The said composition was spin-coated on a silicon wafer, baked, exposed to ArF laser (193 nm), post-exposure baked and developed to form a pattern (see ex. 17, c. 13, l. 65-c, 14, l. 10). It is the examiner's position that ethylene glycol is a well known and conventional crosslinking agent. Example 1 of Lee meets the limitation of the instant claim wherein a polymer is crosslinked by a separate crosslinker. The polymer of example 15 meets the limitations of a polymer that is completely free of aromatic groups having (1) units that are crosslinked to other polymer units (monomer d) and (2) tertiary non-cyclic photoacid labile groups (monomer c). The

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comprising language of the claims allows for the presence of additional monomers. The process of example 17 meets the process limitations of the instant claims wherein the composition is coated on a substrate, exposed to a wavelength of less than 200 nm and developed to form a pattern. Although Lee fails to exemplify an exposure step at 157 nm, the disclosure clearly teaches that exposure can be done using a deep UV exposer or an excimer laser exposer such as ArF, KrF, VUV, EUV, E-beam, x-ray or the like. One of ordinary skill in the art could clearly envision using a VUV (157 nm) exposure (c. 5, l. 29-35).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 33-34 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,200,731 B1) as applied to claims 26-30, 32, 35-43 and 45 above, and further in view of Takeda et al. (US 6,156,481 A). Lee as discussed above teaches all the limitation of the claimed invention except the use of a divinyl ether crosslinking agent. Lee exemplifies the use of ethylene glycol, 1,3-propanediol and the like. Lee however fails to explicitly discuss the requirements for the crosslinking agent. Therefore one of ordinary skill in the art would have been motivated to use any crosslinking agent depending on the type of functionality desired within the polymer. Divinyl ethers are well known and conventional in the art. This position is supported by the teachings of Takeda (US 6,156,481), which

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discloses that exemplary divinyl ether compounds include ethylene glycol divinyl ether, 1,4-butanediol divinyl ether and 1,4-di(vinyl ether methoxy)benzene (c. 8, l. 7, l. 47-c. 8, l. 34).

One of ordinary skill in the art would have been motivated to use any conventional crosslinking agent such as 1,4-butanediol divinyl ether to make the polymer of Lee depending on the type of functionality desired in the said polymer.

12. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,200,731 B1) as applied to claims 26-30, 32, 35-43 and 45 above, and further in view of Varanasi et al. (US 6,140,015 A). Lee as discussed above teaches all the limitation of the claimed invention except the an etching step as set forth in instant claims 47-48. It is the examiner position that a chemical etching step is well known and conventional in the art. This position is supported by the teachings of Varanasi (US 6,140,015 A), which teaches that the pattern formed from the photoresist structure can be transferred to the underlying substrate by reactive ion etching or some other type of etching technique. Thus making the resulting photoresist structure useful in making integrated circuits (c. 10, l. 13-25). One of ordinary skill in the art would have been motivated by the teachings of Varanasi to perform a conventional etching step on the formed patterns of Lee in order to make the structure useful in the filed of integrated circuits.

Response to Arguments

13. Applicant's arguments with respect to the instant claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Jung et al. (US 6386770B1), which teaches a novel photoresist polymer which has excellent etching and heat resistance.

b. Adams et al. (US 6410209 B1), which teaches a method of utilizing antireflective coating compositions with exposure under 200 nm.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

17. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

18. Please note that the examiner has recently changed her name from "Clarke" to "Thornton".

yc
March 13, 2003



**ROSEMARY ASHTON
PRIMARY EXAMINER**